Interactive Storytelling, Artificial Intelligence and *iGiselle*

Vadim Bulitko
Outline

- Problem Formulation
- Our work
- Applications
Problem Formulation

Problem
- to develop deeply interactive video games / multimedia training systems

Hypothesis
- if you know something about the **specific** player/trainee
- then you can improve **their** gaming/training experience

Cannot enclose game master with every game/MOOC
- need AI
- for **player-specific** gaming/training
Framework

- Player/trainee in an immersive **multimedia environment**
  - his/her experience is **managed** dynamically/on-line
    - by an **AI manager**
      - models the player/trainee
      - uses the model to **select the next bit of content**
      - to follow **authorial constraints**
  - **AI-based experience management**
1996 - 2000: Intelligent Training Systems

- Training for damage control aboard naval vessels
  - simultaneous crises, uncertainty, stress, teamwork
- Real-life training: rare, expensive and dangerous
- Need immersive **multimedia training**
- **AI** for:
  - providing instructional feedback to the trainee
Emotions need to be modelled procedurally

- mapping from actions to emotion states
- appraisal model of emotions
- resource model of emotions

EMA + CAB = CEMA

Now combining CEMA + COR-E
2007 - present: Play-style Modeling

- Model the player’s inclinations
- RPG style
- Select content which is most aligned to with play style
- PaSSAGE
  - shown to increase the player’s fun
Congratulations, students.
Too expensive to manually specify all narrative branches

AI planning:
- domain theory + goals = plans
- use the playstyle model to select the best plan

PAST results:
- shown to increase perceived agency
2012 - present: + Emotion Modeling

- Several accommodations of player’s actions may be generated by the planner
  - select the one to keep the player on an emotion trajectory

- PACE (Player Appraisal Controlling Emotions)
- iGiselle (Apr ’13 - Oct ’14)
iGiselle

- AI experience manager
- Models the player’s
  - playstyle inclinations
  - goal desirabilities
  - emotions
- Uses the model to select narrative content
  - from alternatives computed by an AI planner
  - to keep the player on an emotion curve
### iGiselle Credits

**AI design**
- Vadim Bulitko (lead)
- Sergio Poo Hernandez

**Software development**
- Sergio Poo Hernandez (lead)
- Igor Pereira Machado
- Renato Ribeiro
- Sarah Beck
- Trevon Romanuik

**Ballet choreography**
- Nicole Papadopolous
- Laura Sydora

**Photography**
- Vadim Bulitko
- Emilie St. Hilaire

**Artists**
- Emilie St. Hilaire
- Sergio Poo Hernandez
- Allyson Shewchuk
- Luke Slevinsky
- Jesse Underwood

**Sound recording/editing**
- Nicole Papadopolous
- Kevin Hoskin
- Emilie St. Hilaire
- Laura Sydora
- Sergio Poo Hernandez
- Allyson Shewchuk
- Luke Slevinsky
- Jesse Underwood

**Soundtrack**
- Emilie St. Hilaire (lead)
- Wayne DeFehr

**Writing**
- Emilie St. Hilaire (lead)
- Laura Sydora
- Sarah Beck
- Nicole Papadopolous
- Sergio Poo Hernandez
- Nora Stovel

**Visual cast**
- Aphra Sutherland
- Andrea Ginter
- Kandise Salerno
- Nathan Lacombe
- Charles Nokes
- Kiera Keglowitsch
- Tara Gaucher
- Rachel Ginter
- Karly Polkosnik
- Sierra Lacombe
- Justin Kautz

**Voice cast**
- Dawn Harvey
- Jessica Watson
- Jeanine Bonot
- Grant Eidem
- Yvonne Desjardins
- Dale MacDonald
- Sarah Beck
- Leah Beaudry
- Nicole Papadopolous
- Larissa Thompson

**Support**
- Emilie St. Hilaire
- Sarah Beck
- Susan Howard
- Sunrose Ko
- Geoffrey Rockwell
- Oliver Rossier
- Mark Riedl & NCSU
- Alejandro Ramirez & IRCL
- Christina Gier

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**Directed by Vadim Bulitko**

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Nora Stovel
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Planning Narrative Alternatives

narrative progression

player

talk to a rival

AI

confrontation

apology

Talk to a rival

Confrontation

Apology
Goal Model

- Story: 0.3
- Show off: 0.7
- Modesty: 0.2

- Career: 1.79
- Conflict avoidance: 0.03
- Attention gain: 0.76

Narrative progression:
- Talk to a rival
- Confrontation
- Apology

Player

AI
Emotion Model

1.448
0.76
0.03

career
conflict avoidance
attention gain

talk to a rival

confrontation

apology

narrative progression

player

AI

100%

career
conflict avoidance
attention gain

0%

100%

70
0
50

50
30
40

career
conflict avoidance
attention gain

hope
joy
fear
distress

70
80
40

0.892
1.79
0.76
0.03

career
conflict avoidance
attention gain

0.76
0.03
0

career
conflict avoidance
attention gain

0%
50%
100%

0%
50%
100%

0%
50%
100%

0%
50%
100%

hope
joy
fear
distress

career
conflict avoidance
attention gain

0.892
1.79
0.76
0.03

career
conflict avoidance
attention gain

0.76
0.03
0

career
conflict avoidance
attention gain

0%
50%
100%

0%
50%
100%

0%
50%
100%

0%
50%
100%

hope
joy
fear
distress

Vadim Bulitko | February 5, 2015

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Selecting the narrative

- Hope
  - talk to a rival
  - confrontation
  - apology

- AI

- Player

Graph showing the progression of emotions:
- Hope: 1.448
- Joy: 0
- Fear: 0
- Distress: 0

Graph showing the progression of emotions:
- Hope: 0.892
- Joy: 0
- Fear: 0
- Distress: 0
iGiselle Implementation

- Modified PAST state maintainer (Lisp)
- FastDownward PDDL planner (C++/Python)
- Playstyle model (Lisp)
- Goal model (Lisp)
- Modified CEMA emotion model (Lisp)
- GUI (C#)
- Kinect pose recognizer (C#)

- Domain description
  - PDDL
  - Lisp-like
- Target emotion curve
- Still images
- Voiceover files
- Background music
iGiselle interface

poses to select from

Kinect skeleton

original soundtrack

narrator + voiced-over characters

cell-shaded images: portraits + backgrounds

narrative choices computed by the planner

1. “Giselle introduces herself to the other dancers while warming up.”
2. “Giselle warms-up in a corner to calm her nerves.”
3. “Giselle warms-up confidently.”
2010 - present: Flow Modeling

- Several accommodations of player’s actions may be generated by the planner
- select the one to keep the player in flow

• clearly defined goals
• immediate feedback
• skills match challenges

primary source of enjoyment/happiness

“The Art of Game Design” book by Jesse Schell
Application #1: Video Games

- Managing player’s experience
  - modeling the player
  - adjusting the story
  - adjusting the difficulty
Application #2: Intelligent Training

- Build the training scenario on-the-fly
- to keep the trainee on a certain emotion/stress curve

- Emergency room training
  - Neonatal intensive care program
  - Royal Alexandra hospital

Application #3: Online Education

- Massive Open Online Courses (MOOCs)
  - use AI to select the content intelligently, per student
  - model the student’s emotional state (e.g., frustration)
Summary

- Improving gaming/training via:
  - AI-based experience management on the fly
    - player/trainee modelling
      - playstyle + goals
      - emotional state
      - automated planning

- Applications
  - video games
  - intelligent training
  - MOOCs

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